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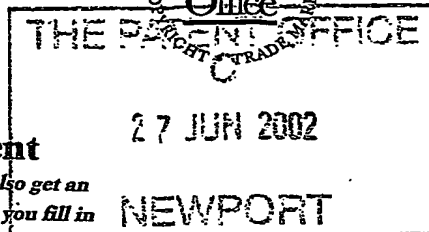
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27JUN02 E 29010-1 C56755
P01 7700/0.00-0214841.9

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
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NP10 8QQ

1. Your reference

2. Patent application number

(The Patent Office will fill in this part)

0214841.9

27 JUN 2002

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Zia Shlaimoun

of 21 Glebelands Avenue, South Woodford, London E18 2AB

Patents ADP number (if you know it) 5804414002

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

Voltage Capping Device

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Mr Z Shlaimoun - as above

Patents ADP number (if you know it)

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

No

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form.
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Continuation sheets of this form

Description

3 4

Claim(s)

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Abstract

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Drawing(s)

2 + 2 RM

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date 26/6/02

12. Name and daytime telephone number of person to contact in the United Kingdom

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Title: Voltage Capping Device

The present invention relates to a Voltage Capping Device for electrical equipment.

Many sites such as commercial premises, e.g. shops and offices, operate a range of electrical equipment such as fridges, cool-rooms, freezers, and computer equipment. Most of this equipment is rated to operate at 230V AC.

The electricity supply to such sites can vary between 200V AC and 250V AC, and in many instances the electricity is supplied at the higher of these two extremes.

If the electricity is supplied at a voltage higher than the rated voltage of an item of electrical equipment, two problems can occur. Firstly excess electricity is consumed resulting in increased costs. Secondly additional heat and losses are generated in the equipment, which can lead to premature equipment failure.

The invention seeks to provide a solution to this problem, and which will also help to prevent damage to electrical equipment due to excess voltage surges.

According to the present invention there is provided a Voltage Capping Device for connection between an AC electrical supply having one or more phases and at least one item of electrical equipment comprising:

- a) An electronic switch for each phase of AC electrical supply, in use between the AC voltage supply and the equipment, to vary the time a voltage is delivered for each half cycle of the AC mains supply,
- b) Output voltage measuring, means to measure the voltage between the switch output and the equipment,
- c) Comparator, means to compare the voltage as measured by the output measuring means with a predetermined voltage value, and

Title: Voltage Capping Device

d) Control, means to control the electronic switch, as dependent on signals received from output measuring means and comparator means, to ensure the voltage delivered to the equipment is substantially equal to said predetermined voltage value.

Preferably the electronic switch consists of a thyristor module that varies the time a voltage is delivered by delaying the onset of each rise in voltage for each half cycle. Preferably the thyristor module is a pair of thyristors placed back to back.

Preferably a bypass switch is provided across the or each electronic switch.

Preferably the capping device is powered from the AC electrical supply.

Preferably a display is provided to display set-up parameters and operating information.

Preferably means are provided to vary the predetermined voltage value.

An embodiment of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 shows a circuit diagram,

Figure 2 shows a thyristor module formed from two back to back thyristors, and

Figure 3 shows a graph on one complete AC cycle as altered by the invention.

Referring to Figure 1 there is shown a circuit diagram of a Voltage Capping Device 1. Voltage capping device 1 is connected between an AC electrical supply having three phases P1, P2, P3 and an item of three phase electrical equipment represented by L1, L2, L3.

Device 1 has three electronic switches THY1, THY2, THY3 between each phase P1, P2, P3 of the electrical supply and the equipment L1, L2, L3 to vary the time a voltage is delivered for each half cycle of the AC mains supply. Switches THY1, THY2, THY3 are each a thyristor module formed by a pair of thyristors placed back to back as shown in Figure 2.

Each thyristor module varies the time a voltage is delivered by delaying the onset of each rise in voltage for each half cycle as described below. Switches THY1, THY2, THY3 can be bypassed using bypass switches S1, S2, S3 controlled either by means of a master bypass switch SW1 or automatically in the event of a fault, operating a bypass contactor control circuit 2.

An output voltage sensor 3 provides a measuring means to measure the voltage between each switch output THY1, THY2, THY3 and the equipment L1, L2, L3.

A comparator means is provided by a comparator circuit 4 to compare the voltage as measured by the output voltage sensor with a predetermined voltage value as varied and set by voltage output set-points V1, V2, V3.

A thyristor control means 5 is provided to control the switches THY1, THY2, THY3, as dependent on signals received from output voltage sensor 3 and comparator circuit 4, to ensure the voltage delivered to the equipment L1, L2, L3 is substantially equal to the predetermined voltage value as varied and set by voltage output set-points V1, V2, V3.

A display 6 is provided to display set-up parameters and operating information.

The capping device 1 is powered from a transformer unit 7 fed from the AC electrical supply P2, P3.

Figure 3 is a graph showing voltage over time. Line A illustrates the waveform of a normal single phase of AC supply (e.g. from P1). Each thyristor switch THY1, THY2, THY3 is controlled to vary the time a voltage is delivered by delaying the onset of each rise in voltage for each half cycle, as shown by line B so as to reduce the waveform amplitude resulting in a lowering of the effective RMS voltage. Increasing the delay causes the waveform amplitude (and hence RMS voltage) to decrease and reducing the delay causes the waveform amplitude (and hence RMS voltage) to increase.

Title: Voltage Capping Device

The capping device 1 thus uses its voltage sensor 3 to senses the output voltage of the switches THY1, THY2, THY3, and this voltage value is then adjusted up or down, by delaying the conduction through thyristors THY1, THY2, THY3, depending on whether the voltage value is below or above the predetermined value, as varied and set by voltage output set-points V1, V2, V3.

It will thus be seen that the capping device of the invention can be used to maintain a voltage supply at a constant level at or below a predetermined value.

In practice, the predetermined value can be set at the rated voltage of electrical equipment L1, L2, L3 so that excess electricity is not consumed resulting in increased costs, and so that additional heat and losses are not generated which can lead to premature equipment failure. This also helps to prevent damage to electrical equipment due to excess voltage surges.

The invention may take a form different to that specifically described above. For example instead of one item of three phase electrical equipment L1, L2, L3, the L1, L2, L3 could represent more than one item of three phase equipment or three separate single phase electrical circuits or a combination. Also the capping device may be used with single-phase electricity, in which case the capping device would have only one electronic switch to control one or more items of single- phase electrical equipment.

Further modifications will be apparent to those skilled in the art without departing from the scope of the present invention.

Title: Voltage Capping Device

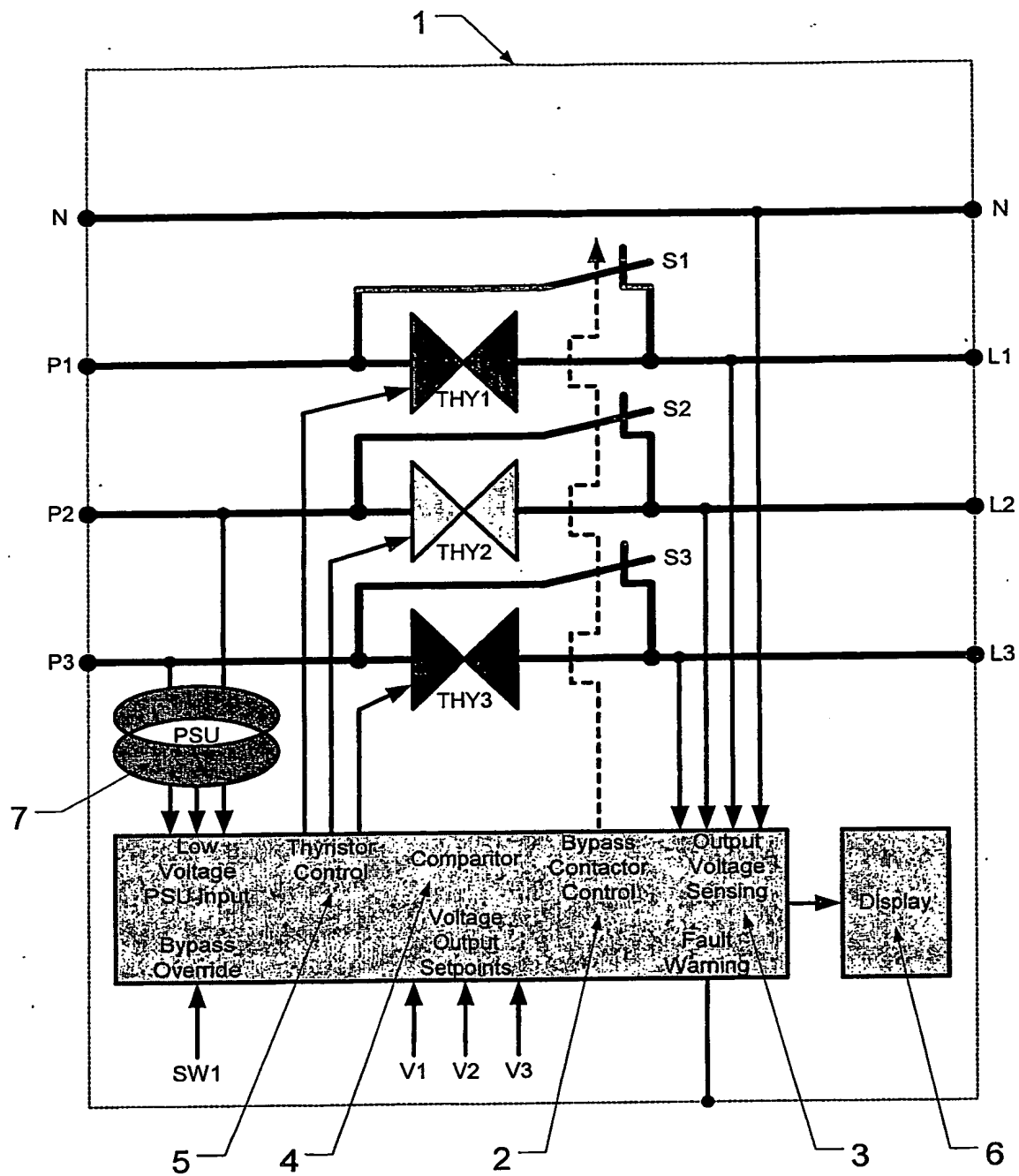


FIGURE 1

Title: Voltage Capping Device

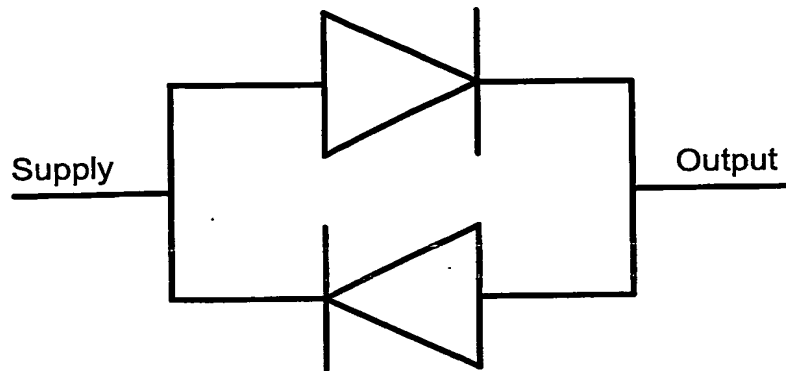


FIGURE 2

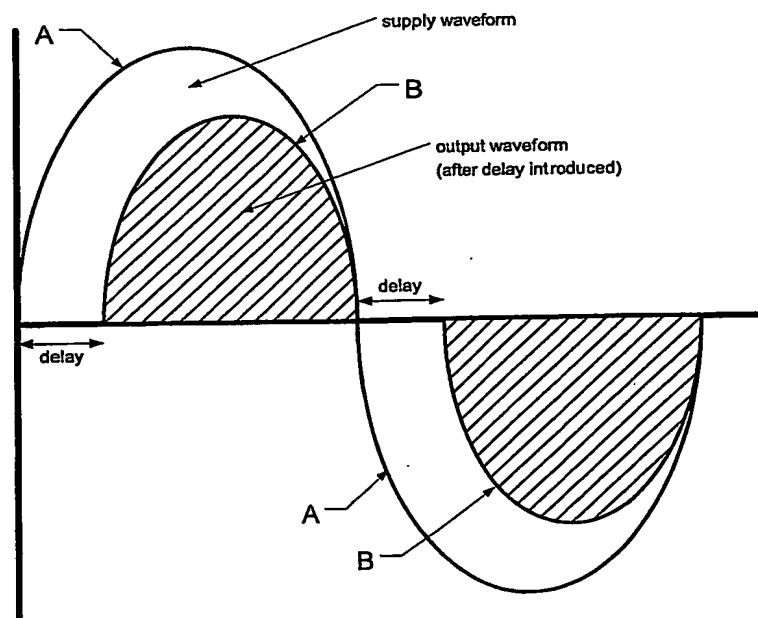


FIGURE 3

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